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Exploring Evolutionary Medicine through 19th Century Medical Collections: Applications in Archival Studies



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Abstract

Evolution has been a paradox in the field of science, but, the study of evolutionary medicine applies both the evolutionary game theory and medicine. This study was conducted to explore evolution by analyzing two 19th century collections of medical formulations and prescriptions while compared to the trend of public health and pathogenic mechanisms. Analysis of organic structure in historical prescriptions, descriptive epidemiology in Kentucky, and the idea of the germ theory will be used explicitly to show the evolutionary change of health and disease. Results of this study intend to provide an intersection between evolution and historical medical formulations. Paleontological studies have been shown to prove our better understanding of basic evolutionary biology.

Purpose

Evolution, public health, and its mechanisms for medicine will be proved through the exploration and analysis of a 19th century medicine archive collection. This primary source authenticates information and relationships between molecular pathways and ingredients of the recipes. It provides a way of connecting evolutionary medicine and historical medical formulations.

Theory

The use of archival research as a primary source ensures absolute truth. This method allows for researchers to use its information as supporting details to its purpose. This type of research is more complex and time consuming than the traditional internet search. Archival sources are held in a Special Collections library or other form of repository. These sources can be materials such as manuscripts, objects, documents, and electronic records. To process any collection, has its own methodology that abides by the guidelines of the Society of American Archivists.

The collection analyzed is a medical manuscript (Fig. 1.) of recipes presumably maintained by a physician or pharmacist in Kentucky. Procedures on how to concentrate certain ingredients are in the back of the manuscript, while the first half gives the listing ingredients, measurements, and instructions on how to make each compound. This collection represents pharmacognosy, the study of medicinal drugs derived from plants while studying properties of natural drug sources. This study also combines the idea of homeopathic remedies which embraces a natural approach to heal a person as a whole instead of focusing on the infected area. Medicine during the 19th century was limited, and until the 1940s, medicinal drugs were derived from mostly natural sources to make patients feel comfortable while the infection ran its course through the body. The principle of "like cures like", *similia similibus curentur*, proposed by Dr. C. F. Samuel

Hahnemann (1755-1843), Robert Koch who gave us the fundamental idea of the germ theory, and the theory of evolutionary game provided a view on the interactions between cause of pathogens and vaccinations

In medicine, evolution is still a paradox to many scientists, chemists, doctors, and pharmacists. Evolution is not just how prokaryotic and eukaryotic species started, but also where it is going and how do we influence it.

During the 19th century, diseases such as diphtheria, a bacterium, and cholera, an intestinal disease that traveled because of the traffic on the water for goods, were common in Kentucky. Since antibiotics weren't developed until the 1940's, compounds were given to simply treat symptoms of the patient. Antipyretics such as meadowsweet helped relieves aches, pains and lowered a fever, while pain relievers such as opium and cocaine were taken to cease diarrhea or cleanse the lower GI tract.

These natural ingredients aroused the immune system and allowed the body to heal naturally by a variety of molecular processes. By analyzing the collection, the ingredients were tabulated and individually looked at by their chemical structure which gives information pertaining to their molecular pathways. By studying this and the epidemiology in Kentucky during this time, a generalization about the use of such remedies can be made about medicine then and now.

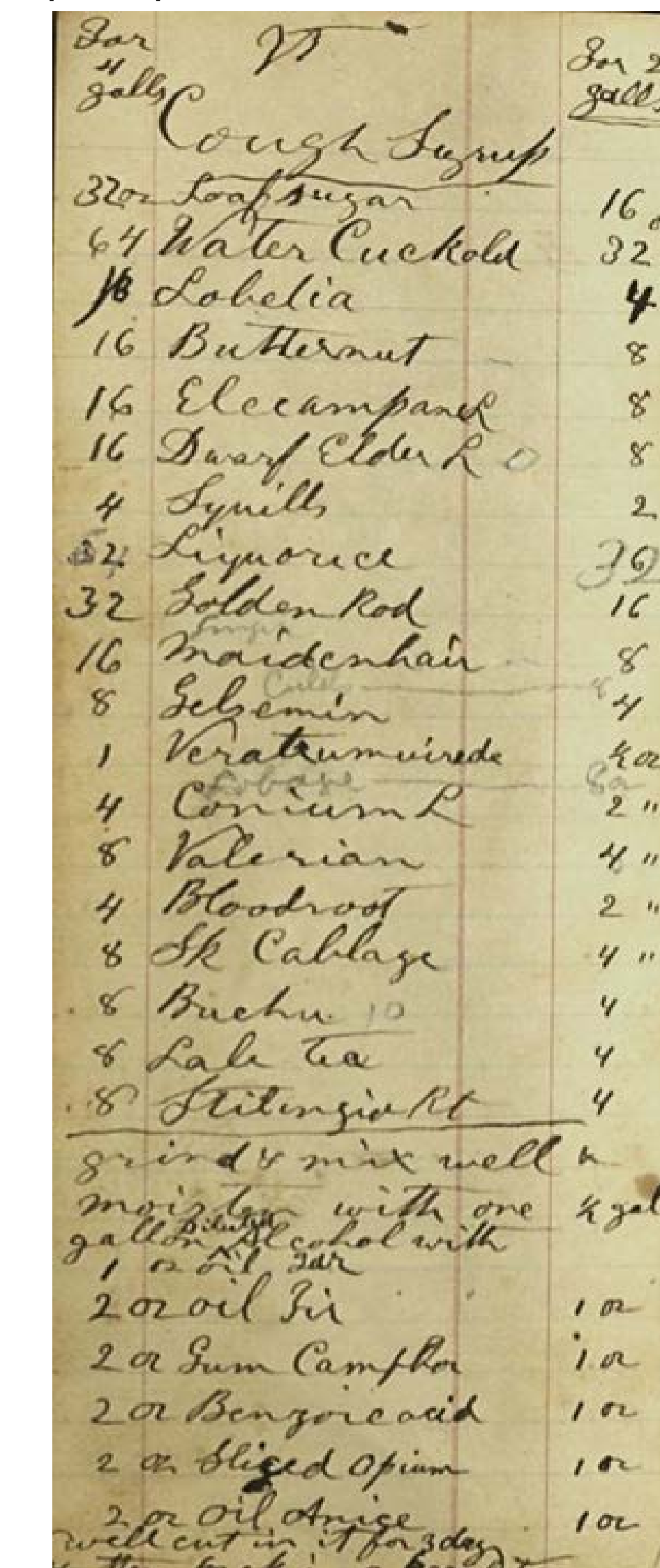


Figure 1. A homeopathic remedy for cough syrup.

Results

The results of this study showed that natural sources that appeared frequently as ingredients for recipes also showed a strong tendency to provide molecular pathways involved throughout the entire body. Less common ingredients had a narrow scope of actions via molecular pathway.

Key	
Herb Properties names	Code
Astringent	A
Anticancer	AC
Antifungal	AF
Anti-inflammatory	AI
Antimicrobial	AM
Antiparasite	AP
Antispasmodic	AS
Bitter	B
Carminative	Ca
Cholagogue	C
Depurative	De
Diuretic	Di
Expectorant	E
Hepatic	H
Nervine	N
Refrigerant	R
Stomachic	S
Tonic	T
Vulnerary	V

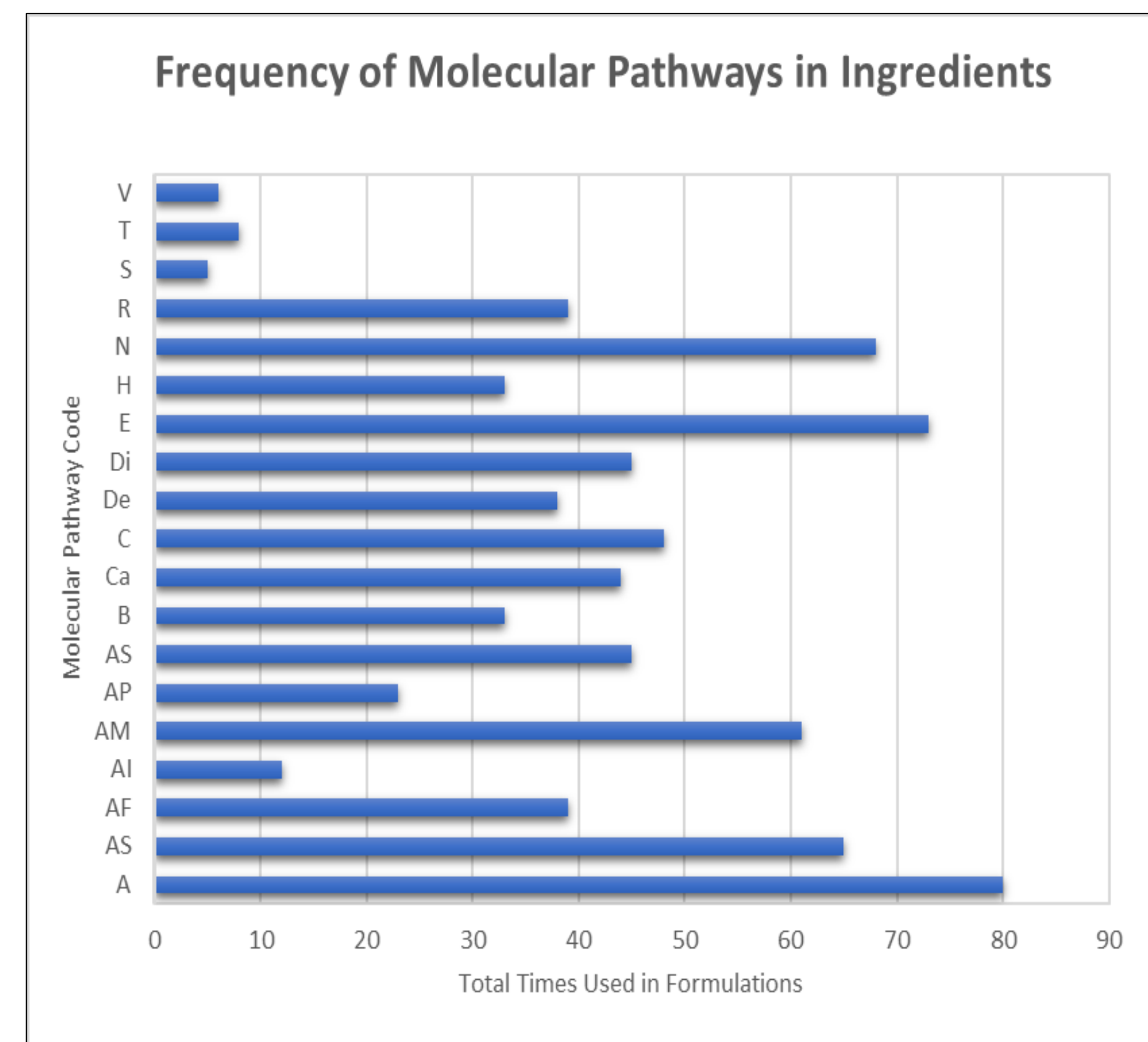


Figure 2. A frequency count of different mechanisms each ingredient displayed in correlation to the amount of times it appeared in the manuscript

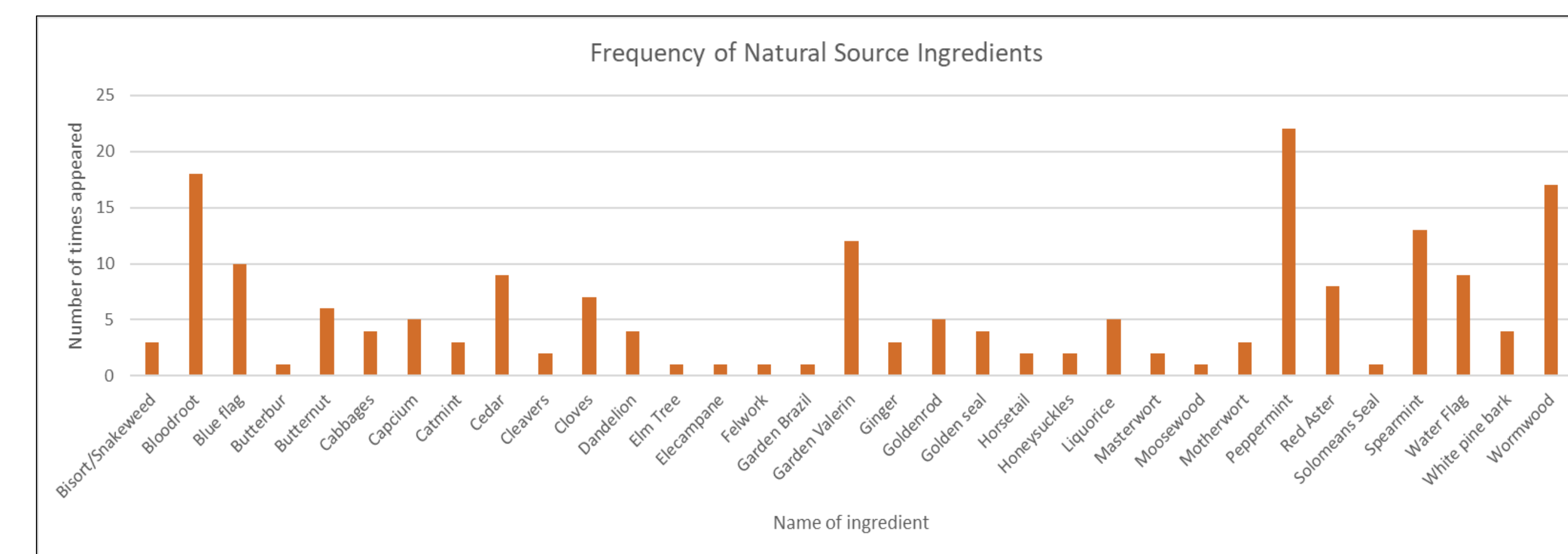


Figure 3. A frequency count that displays each time an ingredient appeared in the manuscript

Discussion

Molecular pathways such as astringent (A), nervine (N), and expectorant (E) showed the highest frequency given the amount of ingredients used to make remedies (Fig 2). These pathways deal with the body as a whole rather than focusing on a particular body organ. Ingredients such as bloodroot, peppermint, spearmint, and wormwood all show properties of this molecular pathways. These ingredients were also the most commonly found in recipes (Fig. 3).

A common misconception with homeopathic remedies is the cure of the disease. These remedies intend to care for the whole body rather than just the infected area by stimulating the immune system. For instance, aspirin, which lowers fevers and relief of aches has a key ingredient: salicylic acid which comes from the genus of shrubs known as *Spiraea*. It can be found in other natural sources such as beans, peas, clovers, and jasmine. Both ancient Egyptians and Hippocrates documented use of willow bark as a remedy to relieve such symptoms. Researchers years later isolated the salicylic acid and conformed it with a buffer to produce acetylsalicylic acid, or aspirin. We now know through demonstration that aspirin

inhibits production of hormones called prostaglandins. These hormones are the cause of clots forming, which leads to heart attacks and strokes. As an inhibitor, aspirin is now recognized as the heart-attack prevention drug. Aspirin also works as a pain reliver by blocking an enzyme that is necessary for the process of an inflammatory response.

Over the years, studies have been done exclusively to see the potential of aspirin. In 2010, a study on daily aspirin use over 5 years showed evidence in the reduction for risk of cancer. These findings have implications for aspirin use and helped the understanding of carcinogenesis and drug intervention. It also shows the relationship between homeopathic remedies starting back from willow bark, an ingredient that was commonly used during the 19th century for pain relief, and the evolution of its main ingredient in medicine to become a world-renowned drug used today in modern medicine.

Many pharmaceutical compounds have been developed from natural products used as

traditional medicines. The results indicated several commonly used ingredients such as blood root, *Sanguinaria canadensis*. The plants rhizome contains several forms of alkaloid shown in Fig. 4 that target multiple processes such as anti-inflammatory (AI), antimicrobial (AM), and anticancer (AC) at the molecular level. Bloodroot was once an ingredient in both mouth wash and toothpaste and did show reduction of plaque growth but was has since been removed for medical use for further clinical testing due to its toxicity and possible synergistic effects.

Overall, the exploration and analysis of an archival source to show the relationship of the ingredients used in the 19th century for illness and medicine used now was somewhat successful.

Conclusion

The use of primary sources can help provide understanding, answers, and connections to those who explore archival collections in research. These collections expand our knowledge on the history of medicine from the 19th century and provides a list of commonly used ingredients to give insight on what was being prescribed as a remedy to ease symptoms given the epidemiology in Kentucky. It also aided to our understanding of our basic evolutionary biology. Homeopathic medicine is still practiced today as scientific societies such as the American Society of Pharmacognosy (ASP) and the American Institute of Homeopathy (AIH) promote the growth and development of crude drugs.

This study supports this practice of medicine by looking at drugs used now in modern medicines and analyzing the compound and its individual ingredients of natural sources that were administered years ago to ill patients. It helped stimulate the immune system and the body's natural ability to heal by diluting potency for maximum benefits.

Acknowledgments

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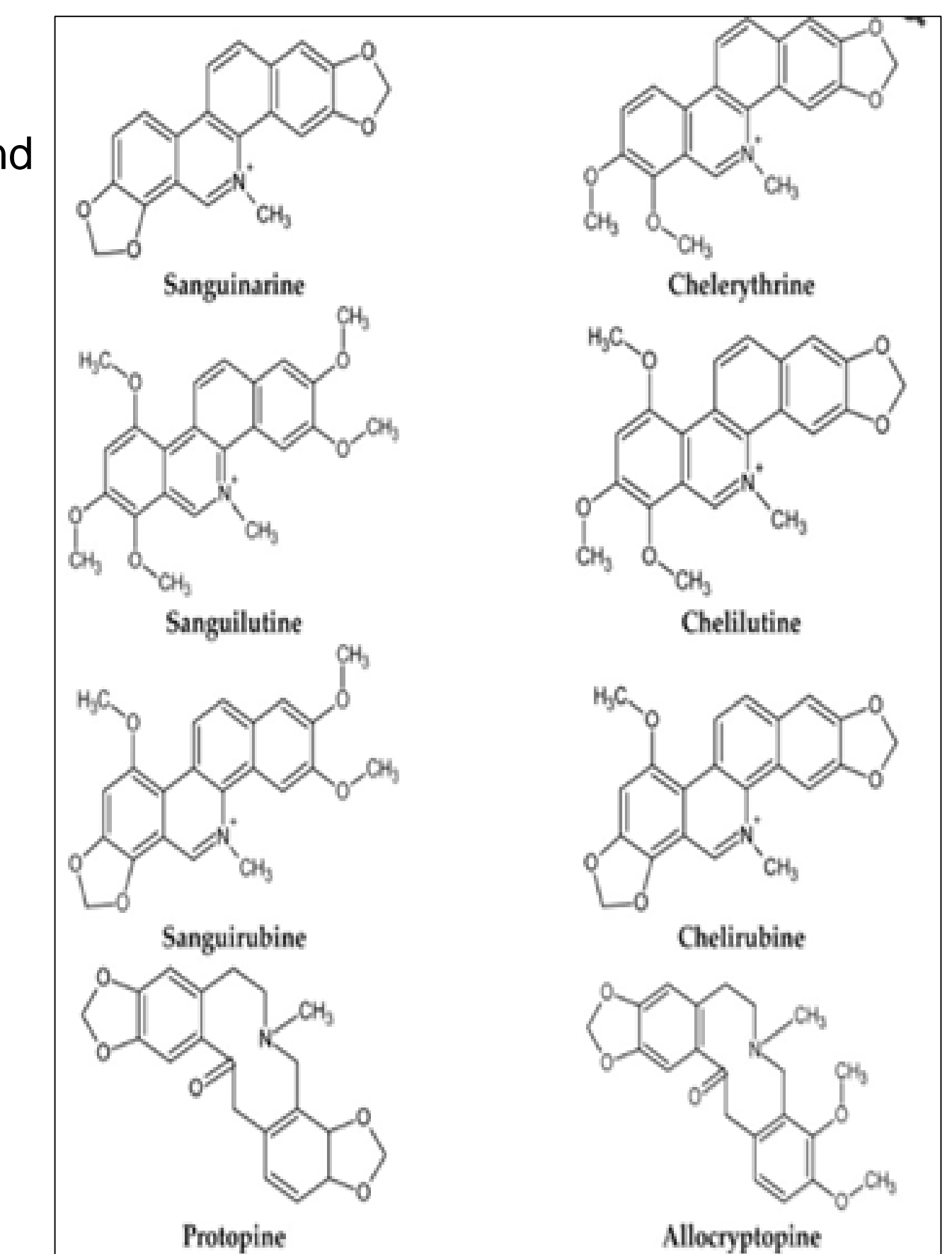


Figure 4. Chemical structures of *S. canadensis* alkaloids [3].